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THE ECONOMIC GEOGRAPHY OF CHILE.

BY

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GENERAL DESCRIPTION.

Chile is a country of geographic extremes. The long, narrow strip between the Andes and the ocean, extending from 18° S. to Cape Horn, is half as long again as is the United States from north to south, and, excepting Brazil, covers more degrees of latitude than any country in the world. No country equals Chile in the range of her climate. In the north is the desert, one of the most absolute upon the globe, and with the full rigour of the tropic sun. In the south are drenching rains and the glaciers, snows, and mists of the cold temperate or well-nigh sub-arctic region of Magellan Straits and Cape Horn. In elevation the same extremes are found. In some parts the coasts are towering cliffs and on the not far distant eastern boundary are the steep and almost unscalable Andes, whose summit at Aconcagua was until recently the highest point reached by man. The snow-capped peaks of this remarkable mountain system "can be seen from almost any point within the territory." *

Chile's nearest geographic and climatic counterpart is to be found upon the Pacific Coast of North America. If Chile were inverted and brought alongside of the North Pacific coast, the similarity would indeed be striking, for in addition to the general resemblances that come from latitude, glaciation, ocean currents, and winds, the topography of the two regions happens to have in com-

* From a report by the United States Consul-General at Santiago in Commercial Relations of United States, 1901, Vol. II., p. 649.

mon a low coast range and a high sierra enclosing a fertile valley in a latitude most favourable for the development of agriculture. The inverted Chile would face the coast of North America from a point on the Mexican coast opposite the City of Mexico to Southern Alaska in the vicinity of Sitka. These rather surprising dimensions are possible because North America, being almost entirely in the temperate zone, measures its length chiefly between the Polar regions and the tropics and does not approach the equator, while South America stretches across most of the temperate zone and the torrid to the equator and nearly a thousand miles beyond it.

The chief element of climatic difference between the corresponding latitudes of Pacific North and South America is in the ocean current that bathes their shores and from which blow the prevailing winds which dominate their climate. The North American current has its origin in the warm Japanese current that is only partially cooled and slightly mixed with Arctic waters in passing Kamchatka and Alaska. The Chilean current has an unobstructed sweep from the ice-clad shore of the Antarctic continent, and its cooling effects extend even beyond the equator, giving the South American coast a cooler climate than corresponding northern latitudes. The southern coast of Chile, like that of British Columbia and Alaska, has been chiselled out by glaciers until the coast range is reduced to a succession of bold rocky islands and the interior valley is a succession of sounds. In the North Temperate Zone Vancouver Island and Puget Sound mark the end of this formation in latitude 48° N. In Chile the sounds extend to latitude 42° S. where the Gulf of Corcovado separates the Island of Chiloe from the mainland. In both continents the fiord districts are visited by heavy rains and clothed with dense forests. Thence the rainfall declines as we progress equatorwards until on the margin of the trade-wind zone agriculture is only possible by irrigation and, finally, the supply of water for this purpose failing, the region of desert is reached. From Puget Sound to San Diego, the southernmost outpost of California agriculture, is $15\frac{1}{3}$ degrees, but owing to the climatic difference above referred to, the corresponding region in Chile from Huasco to Port Montt is about two degrees less.

In the North and South Temperate Zones these central belts, bounded on one extreme by the aridity of the region of the trade winds and on the other by the cold and rugged forests, are the zones of agriculture, the centres of population and power. On each side are the less hospitable zones that can only be useful in

the more secondary way, resulting from the purely extractive industries of the moist forests or the deserts with their minerals. Although the Chilean desert is one of marvellous riches and is now a scene of busy industry, it cannot become a permanent abiding place for man unless some entirely unforeseen climatic changes occur. The southern forests may become the home of considerable settlements of a permanent character, depending for their livelihood chiefly upon forest products, but the economic centre of gravity and the home of four-fifths or more of Chilean population is, and must continue to be, in the central or agricultural region.

Before going into a fuller description of Chile's natural wealth and industries, it is well to give some attention to the resources that lie in her people.

II. CHARACTERISTICS AND SOCIAL CONDITION OF PEOPLE AS AFFECTING INDUSTRY.

Economic geography cannot stop with a mere enumeration of physical resources. There may be conditions present that bar the way to their utilization, and resources are resources only in the light of their prospective or possible conversion into utilities available for human consumption. Natural resources and man must both be considered. For example, the Amazon Valley possesses a fertility of soil probably unrivalled on the surface of the earth, but the heat, the rainfall, the forest, the floods, and the consequent diseases and discomforts make it uninhabitable except to a few sickly rubber gatherers, and the utilization of the region on a large scale as a home for civilized communities of progressive race cannot now be foreseen.

Chile has the great advantage that, with all the extremes, the climate is everywhere healthful, and the country possesses the climatic possibility so rare in Spanish America of becoming a white man's land, and fully entering into Western civilization, stability, and industry. The people style themselves the Yankees of South America. Racially, Chile will be a white man's land in a modified sense only. One-third of the population, and the dominant third, is of pure Spanish race. The remaining two-thirds are of mixed Spanish and Indian, with a small remnant of pure Indian (Araucanian) in the South. In the racial elements there present Chile is far ahead of any other Spanish-American country bordering on the Pacific. In most of these countries the population is almost entirely native, some writers putting the white population of Nica-

ragua, for example, at 1,200. Honduras has but a few thousand, and the proportions are virtually the same in Ecuador and Peru. The Chilean half-breeds and working classes, though good workers when sober, are reported as ignorant and much given to drink, and the mortality among them is very high.*

The Spanish people in Chile are the Basques from the northern part of Spain, and the best workers in the Peninsula. The Chilean natives—the Araucanians—are, for native Americans, superior stock. They drove the early Spanish settlers out of southern Chile a century after the settlements were founded, and maintained themselves in semi-civilized independence until late in the 19th century, when they were again brought under white rule and their lands thrown open to settlers, some of whom have been Germans.

Proof of Chile's superiority among Spanish-American countries upon the Pacific is seen in her peaceful history and in her substantial industries. While most of the other so-called republics have, since their independence from Spain, been convulsed by the strife of mediaeval knights-errant and reduced to chaos and anarchy, Chile has had comparative peace,† unbroken except by one short and sharp civil war and one foreign war of remarkably successful conquest.‡

The economic advantages of race, climate, and natural resources are partly offset by the social conditions of the country. Although free from war, Chile is an aristocracy where well-nigh feudal conditions prevail. The property of the country is in the hands of a few. Agricultural estates are often of enormous extent, a thousand-acre farm being considered small, and 10,000 and 20,000-acre tracts not uncommon. When public lands upon the frontier are sold the tracts are large, 1,500 to 5,000 acres, and the same individual can arrange to secure as many tracts as he wishes. The owners of these great estates live like princes. Absenteeism is common, and the unlettered and shiftless labourers are in a state

* Bad sanitation is everywhere, and the death-rate of Valparaiso and Santiago is 70 per 1,000, more than three times as great as in corresponding European and American cities. W. A. Smith, *Temperate Chile*, p. 37.

† Chile has not had wars, but neither has she had security for the individual. The enforcement of law is lax and violence is common. One British observer declares that 3,000,000 Chileans commit more acts of violence annually than the 85,000,000 in the United States. W. A. Smith, in *Temperate Chile*.

‡ The valuable nitrate fields of Chile were wrested from Peru and Bolivia as a result of the war of 1879-84.

Strained relations with Argentina over the boundary dispute, 1896-1902, led to war preparations that were a considerable embarrassment to industry.

of semi-serfdom because of continuing indebtedness. These great estates hamper the development of industries, especially agriculture (an experience that California has shared). Much of the Chilean land is unused and held for speculative purposes by the very powerful Church and by the wealthy aristocracy, the Church waiting for others to make it valuable, and the aristocracy striving to live by political means in the cities. A decade ago the rich and undeveloped country was, because many were unemployed and wages for the worker were low, in a serious industrial condition, with great social discontent. The landless population had gathered in cities to an extent almost unprecedented in such a country,* and relief has been sought in the establishment of a protective tariff, which is very popular and is leading to a considerable industrial development, accompanied by a surprising decline in the export of wheat.

Two methods may be followed in presenting a view of the industrial life of a country. One of these is the description of industries one after another for the whole country, and the other is the discussion of the resources and activities of the different sections of the country. The first of these methods is better for a country that is within itself free from sharp geographic contrasts, and the second is better for a country that has distinctly marked natural divisions. There is no country in the world that lends itself to the second method better than Chile, if indeed as well. The long strip of plain and plateau between the ocean and the Andes, extending from the hot sands of the tropic desert to the vanguard glaciers of the Antarctic, measures off one geographic unit after another with a precision rarely found and easy to classify. The evenness of the oceanic climate adds to the precision of the distinctions.

For the purposes of this paper Chile is best divided into three regions: I. The Northern Deserts; II. The Central Agricultural Region; III. Patagonian Chile.

III. THE NORTHERN DESERTS.

The northern third of Chile is remarkable among deserts, because it possesses great mineral riches and furnishes five-sixths of the national revenue. Aridity is usually a curse upon any land, but

* See *Engineering Journal*, Vol. 8, p. 29. The Census of 1895 reported an urban population of 1,240,353 and a rural population of 1,471,792, and this in a country with almost no industries.

the aridity of the Chilean desert is the source of its greatest wealth, and if the climate of this district should suddenly change to one of moderate rainfall, the value of the desert would melt away, great industries would be destroyed, national finances wrecked, and an economic crisis brought about. Here in an absolute desert, without traces of animal or vegetable life, is practically the world's supply of nitrate of soda, an important chemical and the strongest-known agent for the promotion of plant life.

For more than 500 miles the upper earth is charged and the surface often covered with incrustations of salts left by the evaporation (apparently) of sea water. These salts are chiefly lime, soda, magnesia, alumina and boracic acid, and the important deposits of soda (nitrate) occur to the east of the coast-line of hills,* at an elevation of 3,000 to 4,000 feet and a distance of from 15 to 90 miles from the ocean, but some of the deposits of other salts, especially borax, are at much greater distances inland, extending even into Bolivia and the northwestern province of the Argentine.

The exact nature of the origin of these deposits is still in doubt. Recent geologic changes are evidenced by the remains of 12 successive beach marks in 2,500 feet elevation on the hills back of the port of Mejillones. The amount of salts remaining is much too great for a simple impounding of an arm of the sea. But it is suggested that a tide may, at frequent intervals, have re-filled it, and that great accumulations of seaweed furnished the nitric acid necessary to convert the sodium into nitrate of soda. The presence of iodine (a component of seaweed) helps bear out this theory, as does the presence of fragments of undecayed seaweed. The location of the richest deposits on the sides of hills is further evidence of beach deposits.†

The nitrate is found in a narrow strip from 1 to 4 miles wide and extending, with occasional breaks, for about 300 miles‡ north and south on the east side of the coast range. The actual deposits cover about 220,000 acres. This mineral is by far the most valuable natural resource, and gives rise to Chile's chief export and leading industry. The location of these deposits at great distances from any base of supplies has made their utilization difficult and costly, and has always made it necessary to support communities under very artificial conditions. For nearly 900 miles there is no agricul-

* Bulletin of Bureau of American Republics, Vol. II., p. 229.

† For a discussion of theories to explain this wonderful deposit, see Blackwood's Magazine, Vol. 161, p. 431.

‡ Carpenter, F. G., *South America*.

ture possible along the coast; for 400 miles there is not even a stream coming down from the Andes, and in the early days of the nitrate industry the nitrate ports were dependent upon commerce for water, as well as every other article consumed by man or beast. Ships proceeded along the coast, distributing water as they went, and getting a fresh cargo at each end of the route. In 1835 the price at Iquique was 4 shillings 6 pence for 18 gallons; but this industry is now in the main superseded, although steam condensers are common, and water is still bought and sold in some of the smaller places. The recent rapid increase in nitrate consumption has increased the population of the desert ports and put them on so firm a basis that they have laid pipe lines to the Andes. That supplying Iquique is 80 miles long, and Antofagasta draws its water supply 180 miles, probably the greatest distance of any city in the world.*

The life of Iquique is typical of the nitrate ports. Here is a city of 42,000 people located on a sand beach hundreds of miles from supplies, but having street railways, a system of sewers, an ocean cable, telegraph, telephone, electric light, theatres and libraries, newspapers and clubs. Back of the town rises a rocky cliff 2,000 feet in height, up which zigzags the nitrate railway which goes some 40 miles inland to the plain ("Pampa") of Tamarugal, the scene of the greatest nitrate works. This railway is a standard gauge line 300 miles in length, extending to the port of Pisagua on the north and to Lagunas on the south. Other roads connect this plain with the ports of Agua Santa and Junin.

The nitrate industry itself, like the towns along the coast, has been transformed by its prosperity. It is prosecuted by both native and foreign capital, but especially British,† and the companies operate on an extensive scale. The plants are enormous structures, and railway connection is often secured by the building of private lines. One company owns 18½ square miles of land and 70 miles of railway,‡ the road itself costing £650,000. These companies must also build towns in the desert for their hundreds of workmen, and some of them in addition to owning a factory, a mining town and railway, also own a port on the Pacific. The scale and method of operation are illustrated by the experience of a company that made an improvement reducing the cost of production one cent. per hundred pounds of nitrate. The net gain to the

* Carpenter, *South America*, p. 195.

† More than \$100,000,000 (American gold) of British capital are said to be invested in this industry alone.

‡ Bulletin of B. A. R., Vol. II., p. 231.

company was \$1,200 per month, or 6 per cent. per annum on \$240,000.

Darwin described the nitrate deposits by saying that they looked like "a country after snow before the last dirty patches are thawed." The first layer is a thin coating of dust or friable sand and gypsum. The second layer is rocky conglomerate, usually hard, and ranging in thickness from a few inches up to 30 feet. It contains from 10 to 20 per cent. of nitrate, but is cast aside for the third layer, the "caliche," which is softer, sometimes cheesy. In the pampa of Tamarugal this layer ranges from a few inches in thickness to seven and rarely to ten feet, and contains from 30 to 50 and occasionally 80 per per cent, of nitrate. It is obtained by blasting away the three layers and the caliche is then separated with pick and shovel and carted or taken by rail to the reducing plants. Here it is crushed in rollers, dissolved in water, and boiled down in great open vats. When it is reduced to the proper point cooling produces crystallization, the product resembling coarse salt in appearance. Salt is also one of the by-products and iodine is derived from the mother liquor.

The production for five years has been as follows:

	TONS.
1897.....	1,064,075
1898.....	1,254,000
1899.....	1,360,000
1900.....	1,490,000
1901.....	1,263,000

As this region has a practical monopoly of the world's nitrate trade, it was a comparatively simple matter for the producers to form a combination for the control of output and prices. In 1901 the industry was not considered sufficiently profitable, and the nitrate association ordered a 10% reduction in output and a 25% increase in price. The agreement has been maintained, to the great increase of dividends in the constituent companies. The same organization conducts an organized propaganda in Europe and America to increase the consumption of nitrate by spreading knowledge of the uses to which it may be put.

The Chilean Government also takes advantage of the fact that its nitrate is a monopoly. The foreigner who exploits the fields complains that the Government exploits him. Certain it is that five-sixths of the Chilean Government revenues are derived from the export duty that is levied on nitrate of soda and its by-product, iodine.

The question of the continuance of the supply of nitrate is an important one owing to the increasing dependence upon it of both chemical manufacture and agriculture. The cessation of the supply would lead to serious inconvenience to many industries and might embarrass the world's food supply.*

The Chilean Government engineers estimate the available nitrate at about 220 million tons, a supply sufficient for many decades even at the present rate of increase in consumption. A higher price would make possible the reduction of the low grade and harder nitrate rock that is now thrown aside.

The Chilean desert also produces a large part of the world's borax, the supply appearing to be unlimited and the output coming from several localities. Owing to the purer but more scattered deposits and smaller scale of these operations, much of this mineral is carried a considerable distance on mules or in wagons.†

Another desert product of the northern coasts is guano, the droppings of sea birds which have remained for ages undisturbed and untouched upon the rocks where the birds congregate. This industry is now in its last feeble stages. Its prosecution was too simple and easy to endure. The deposits of Chile never rivalled those of Peru, and both are now nearly exhausted and the export has sunk to a comparatively small figure‡ and is likely to disappear, as Chilean agricultural operations will probably demand the small annual output. This industry passed its prime a quarter of a century ago and has been succeeded by the nitrate industry.

In addition to the products due directly or indirectly to its aridity, the desert region is rich in copper, gold, silver, iron, and manganese ore. The silver, gold, copper, and manganese are mined, despite difficulties imposed by the climate. Many of the mines are so situated that the ores and water for the miners are taken considerable distances in carts or on the backs of mules, and only ores of high grade can be used. A few thousand tons of iron ore are taken annually from the port of Coquimbo to Antofagasta for use as fluxes in the smelters there, but none is mined for the smelting of iron. A considerable part of the silver and silver ore exported from Chile is the product of Bolivia, brought to the seacoast for shipment by the Antofagasta Railway. In copper production Chile ranks

* Agriculture is finding some relief in the discovery that the leguminous plants have the power of securing free nitrogen from the air and storing it in the earth about their roots. Chemical science is striving, and not hopelessly, for an economical method of crystallizing and "fixing" the free nitrogen of the air.

† Commercial Relations of the United States, 1902, Vol. I, p. 746.

‡ 34,434 tons in 1900.

third,* being exceeded by the United States and Spain. A considerable part of the product comes from the central part of the country, where it is smelted in crude furnaces by farmers and cattle raisers, who mine it when not pursuing their regular vocations.†

IV. THE CENTRAL AGRICULTURAL REGION.

As in California, so in Chile the transition from the desert to the agricultural region is gradual. As Santiago is approached going southward there are heavy winter rains and the valleys furthermore are watered to a greater or less extent by the mountain streams from the Andes, making irrigation possible. At Huasco, in latitude 28° S., is the first of these irrigated valleys producing oranges, raisins, wine, alfalfa, and the general agricultural crops. Thence southward to Santiago a succession of these fertile valleys is green with irrigated farms devoted to fruits, the necessary garden crops, and wheat, barley, rye, oats, and forage plants. The proportion of land that is supplied with water for irrigation in the upper part of this district is small, mere oases in a land of semi-arid foothills. These higher lands receive a good soaking in the winter season, and produce a variety of native grass that is very resisting to drought and very nutritious, remaining as natural hay in the dry season. Cattle, sheep, and goats are pastured upon these hills, giving a combination of pastoral and agricultural pursuits, much like that found in some parts of California and New Mexico.

Before Santiago is reached the central valley of Chile may fairly be said to begin. This valley, running southward, is the striking counterpart of the great valleys of California and Oregon, in latitude, climate, rainfall, products, and physical features. It extends from the sunny region of irrigation and sub-tropic fruits to the dripping forests on the cool shores of the southern gulfs. Its length is about 700 miles, the width varies from 20 to 100 miles, according to the windings of the Andes, and the coast range, which here as in California runs close to the ocean, cuts off the valley from the sea. This range is, however, not so continuous as its Californian

* Chile's recent metal exports have been as follows:

	1899.	1900.
Copper, tons.....	19,020	25,178
Copper ore	35,854	20,210
Gold, grammes	1,625,330	1,871,130
Silver, grammes...	75,503,518	45,438,178
Manganese ore, tons.....	—	25,715

† Engineering Magazine, Vol. 8, p. 31.

counterpart, having a number of breaks through which rivers reach the ocean at frequent intervals so that the really continuous valley has a number of drainage systems and a number of outlets to the never-distant ocean. These openings are marked in almost every case by ports, and five* railroads give easy connection with the numerous steamers that ply up and down the Pacific, the greatest commercial artery of Chile. This number of outlets is an advantage no shared by the Californian Valley with its high walls and single outlet at the Golden Gate. The divides between the river basins are not high enough to break the continuity of the Chilean valley, which is traversed from north to south by a trunk line of railway soon to have the last section completed and connect Valparaíso and Santiago with Port Montt on the southern inland sea. With its branches to the coast ports and the different parts of the valley this system is more than twice as long as the distance covered, and is being extended.

This great valley is a region of exceptional fertility and rather more than half of it, from the vicinity of Concepción northward, needs irrigation for successful agriculture. Nature has made this easy.† The valley is usually flat and traversed by many streams fed by the melting snows of the Andes. In some districts these waters are so charged with mud that they annually fertilize as well as irrigate the fields of the farmer.

Like the corresponding region of California the warmer parts of this valley are well suited to the grape, orange, and other sub-tropic fruits. From Huasco southward 500 miles the grape thrives and in a part of the district excellent raisins are produced and the wine industry is pursued in many localities. In the valley of the Aconcagua near Santiago vineyards extend as far as the eye can see, and the annual grape crop is estimated to be sufficient to make a million gallons of good claret, but it is used to make the native drink "chicha."‡ The Chilean wines are of good quality, and some of them are made with the best modern appliances. The import of foreign wines is steadily declining, an export trade is arising and the country has the natural resources for its considerable extension, although its progress is not rapid. From 1897 to 1901 the value of wine exports averaged about \$50,000 (American currency), sent chiefly to Ecuador and Peru.

* Others are in prospect.

† "A great plain, probably an old lake basin, spread out between the two ranges, its flat surface here and there interrupted by the emergent summit of a buried hill."

—SIR MARTIN CONWAY, in *Aconcagua and Tierra del Fuego*.

‡ See *Commercial Relations of the United States*, 1898.

Around Santiago oranges and lemons are grown and the valley southward to about 37° S. is treeless, irrigated, and devoted to general agriculture. The Lombardy poplar tree is very commonly grown along the irrigation ditches, and there are plantations of eucalyptus for timber purposes. Between 37° and 38° S. latitude, the rainfall increases so that irrigation is unnecessary and the forests which occupy the foothills of the Andes for 200 miles farther north now creep into the lowlands and become general on the valley floor. The rainfall increases with the latitude, so that Valdivia and Port Montt have about 100 inches per year,* and are excessively wet. The agriculture of the forested section is essentially temperate in its character and the greater part of the wheat crop is here produced.

The forested part of the Great Valley is a new country. Some of it is now being opened up, and much of the surface is still in forest. This is the old home of the Araucanian Indians, and they still live there. The Bio Bio River was their northern frontier until 1884. Since that date the Government has built railroads into the forests, encouraged colonization and made advances and given free land to European immigrants. As a result the population from near 38° southward to Port Montt is a mixture of Chilean, Indian, and German. When the forest lands are cleared they make fertile fields, and the stumpy new ground of this region resembles the new clearings in the neighbourhood of Puget Sound and the Columbia River. The town of Temuco ($38^{\circ} 40'$ S.), on the line of the new railway, is a town of 20,000 population. It was founded in the woods in 1887 and resembles an American frontier town† in its plan, structure, and the surrounding agriculture. Valdivia and Port Montt (not yet reached by the railway) are usually described as being German settlements where many of the customs and industries of the Vaterland are transplanted intact. Valdivia is the centre of the brewing industry in Chile. Southern Chile, in addition to agriculture, has a lumber industry, and there is considerable tanning, for which the forest supplies the necessary tanbark. Sole leather is regularly exported to Europe, and the domestic shoe supply is nearly all made of native leather.

South of the great valley, which may be said to end at Port Montt, there are some agricultural colonies in the island province of Chiloe. The climate is rainy, the winters have heavy snow, and the sparse population of this inhospitable province is not increas-

* Conway. *The Andes and Tierra del Fuego*, p. 127.

† Carpenter, *South America*, p. 243; W. A. Smith, *Temperate Chile*.

ing rapidly. There is some timber-cutting and the agriculture is that of the cold temperate zone. The apple grows wild in this island and some of the fruit is exported to the mainland.*

Chilean agriculture does not play an important part in the foreign trade, nor does it promise to do so. Witness the accompanying statistics of production. According to the Chilean Bureau of Statistics the acreage and production for 1901 were as follows:†

	HECTARES.	HECTOLITRES.
Wheat	249,865	3,749,835
Barley	41,314	731,647
Maize.....	20,087	305,248
Beans.....	27,438	403,978
Potatoes	47,434	4,093,612
Alfalfa.....	29,286
Clover.....	32,320

The Government is making great efforts to spread a knowledge of technical science, and agriculture may be improved thereby, but the accompanying policy of protection and the consequent increase of urban population gives an increasing home demand. This stimulus of science‡ that is helping agriculture is also working with equal force to promote manufacturing industries, which will tend to cut off export of raw product. The export of wheat, which has been important for many decades, has, for the present at least, disappeared, and considerable imports have taken place. From 1892-96 the wheat export averaged a little over 111,000 metric tons § per year, and there was also some flour exported. From 1897-1900 the wheat export declined to a nominal figure, and in 1901 over 130,000 tons of wheat and flour were imported.¶ This condition was due to a bad harvest, but there is not much promise of a return to the export rank. One-crop farming has reduced the

* Chile also owns the Juan Fernández Islands, famous as the home of Robinson Crusoe. They are reported as having good grass and fruit trees, the descendants of those planted by Selkirk 200 years ago (U. S. Consular Report, Advance sheets, Apr. 4, 1902). A prosperous lobster-canning plant is now in operation, but there are no permanent inhabitants.

† *Bulletin of Bureau of American Republics*, Vol. 14, p. 1042. A hectare equals 2.471 acres and a hectolitre 2.838 bushels.

‡ Among other agencies the Government supports an agricultural college, technical school, weather bureau, fish commission. There is, however, no agricultural journal in the country. The United States and Canada support 543

§ Metric ton equals 36.73 bushels.

¶ See *Bulletin of Bureau of American Republics*, Vol. 10, p. 875-7, Vol. 13, pp. 62 and 1594.

yield of the new fields, and rational agriculture, here as elsewhere, makes slow progress. There is some barley exported from the southern districts, potatoes are sent to the equatorial countries to the north, alfalfa hay is shipped to Peru, and occasionally to Brazil and Europe, about 3,000 tons each of wax and honey are exported, also some walnuts, but none of the articles are in great quantity or give great promise for the future. Further explanations for this are found in the backward agricultural methods and in the small area of Chile's agricultural lands.

The agricultural methods are not thoroughly modernized. The slow ox is the only draught animal in agricultural work.* American and European farm machinery is imported, but a considerable percentage of the farmers still plough with the wooden plough used in the time of Pharaoh, reaping is often done by hand, and treading out the grain is a popular form of threshing.† The agricultural lands of Chile are practically all comprised within the Provinces beginning with Coquimbo on the north and extending to Llanquihue on the south. These Provinces have a combined area of 90,000 square miles, from which 15,000 should be immediately deducted on account of the semi-deserts of Coquimbo and the half of Llanquihue that is south of the Gulf of Corcovado. The remaining 75,000 square miles‡ include the slopes of the Andes, the coast range, and many untillable hills in the north. From this rather restricted area nearly three millions of people are to be fed, and if they develop any extensive agricultural exports these will probably be fruit products, wine, raisins, and dried fruits. These crops require small area for their cultivation, and with her fertile valleys, glacial streams, and warm sunshine, central Chile has the natural equipment to compete with any land in their production.

The chief present and prospective claim of the agricultural section of Chile upon the goods of foreign countries is in return, not for exports to Europe, but for exports to the desert provinces of the north. The nitrate workers consume the products of agricultural Chile and pay for them with nitrate sent to Europe and the

* Carpenter, *South America*, p. 252.

† This is called "la trilla." The sheaves of wheat are laid on the earth in a circular pen. Thirty or forty horses are turned in, and men, by shouting and lashing from the outside, keep the horses racing over the straw till the grain is threshed out.

‡ This area is about half as large as that part of the Pacific coast that remains after eliminating the two-thirds of Washington and Oregon that lie to the east of the Cascade Range and a third (more or less) of California that is virtually desert. California, Washington, and Oregon have a combined population of two and one-half million and California wheat export is not as great as in former years.

United States. The mineral industries of the four northern provinces require the presence of nearly or quite a quarter of a million of people and a large number of work animals in a desert where every handful of horse feed, every wisp of hay, and every bit of bread, meat, fruit, or vegetable must be imported. The supplying of this territory is the real export trade of agricultural Chile, and it is a heavy and growing demand. The foreign goods imported at Valparaiso are chiefly paid for with nitrate of soda exported from Iquique and Antofagasta.

The pastoral industries of Chile are somewhat like the agricultural in their relation to the foreign trade. Throughout the agricultural belt the conditions are suitable for cattle and sheep, and there is a regular export of wool, but the limited area of the country leaves no room for extensive pastoral industries, and here, as in other branches of agriculture, Chile appears insignificant when compared with her rival across the Andes.*

The cattle industry as pursued in Chile resembles that in the United States east of the Mississippi, where stock cattle from the ranges on the Great Plains are fattened on the farms. The Chilean stock cattle are driven over the Andes from the plains of Argentine and fattened on the alfalfa fields in the irrigated valleys at the western foot of the Andes. In recent years a tariff in favour of the land and live-stock owning class has considerably reduced this import of cattle, and the increased area required for their pasturage at home is advanced as one of the reasons for the decline in wheat production.

V. PATAGONIAN CHILE.

Until the latter part of the 19th Century that part of South America lying between 43° S. and the Straits of Magellan was an unknown and unclaimed no-man's land, like Central Africa. While Africa was being partitioned, Chile and Argentine extended their claims over Patagonia, but most of the land has remained unsettled and even unknown until the present time. The recent boundary dispute between Chile and Argentine has given a great stimulus to exploration in a region that greatly needed it, for little was known

	SHEEP.	CATTLE.
* Chile, 1901.	1,335,332	829,953
Argentine, 1900.	120,000,000	28,000,000

Figures for Chile from Bulletin of Bureau of American Republics, Vol. 14, p. 1042; for Argentine from Bulletin of Amer. Geog. Soc., Vol. XXXV, p. 133.

The ratio of sheep to population is about the same in Chile as in United States; of cattle, a little more than half.

save that the Chilean Andes and the Argentine Pampas had some sort of a southward extension. So late as 1898 a Government exploring party for the first time discovered the source of a river 25 miles long flowing down from an outlying spur of the Andes through a forested valley and reaching a fiord-like arm of the Gulf of Corcovado about 40 miles east of Port Montt.

The many exploring expeditions sent out by both parties to the boundary dispute have greatly increased our store of knowledge concerning Patagonia and raised the estimate of its economic worth. To the traveller, steaming up the inner channel of this coast with its labyrinth of fjords and islands,* the land appears hopeless for the uses of man. Glaciers crowd down the sides of precipitous mountains that are gloomy with almost perpetual mist and rain, and covered at every possible point with an evergreen forest, thick with matted underbrush and bamboo. The persistent west wind gives a heavy rainfall, reaching the maximum about 44° S. The explorer is sometimes delayed by two or even three weeks of steady rain, and progress in the forest must be made over a mucky mass of rotting vegetation into which a man often sinks to his knees and where beasts of burden cannot go. Permanent settlements are not likely to be made here, but the inhabitants of the Island of Chiloe have cut timber along the whole length of the coast.

Conditions inland are better. In latitude 40° S. the river Hua Hum cuts through the Andes, and from that point southward to the Straits of Magellan, the Pacific streams, some of them rivalling the Thames, the Seine, and the Potomac in volume, have cut clear through the mountains and often take their rise in the flat plains to the east of the Andes. The summits of the mountains are along the very margin of the sea, or it is even possible that they may be upon islands. These mountains protect in ever-varying degree the valleys of the Pacific rivers from the drenching winds that constantly blow in from the ocean. One explorer† calls these valleys "subandine," and they often contain considerable areas of open pampa land suitable for agriculture and especially for cattle-raising. Deer are now abundant. There are many glacial lakes and valuable forests of birch, cedro, and alerce, a kind of redwood allied to the California species and highly prized for shipbuilding and many other uses. In the valley of the Yelcho (about latitude 43° S.), besides much land ready for settlement, explorers report large

* It is said by Sir Martin Conway to be the most intricate coast-line in the world.

† See Royal Geographical Journal, Vol. XVI, pp. 29 and 186; Petermann's Mitteilungen, 1899, pp. 47 and 124-5.

alerce forests with trees from four to six and even ten feet in diameter. On one of the tributaries of this stream are several hundred Welsh farmers and cattle-growers who have emigrated overland from Chubut on the Atlantic coast in Argentine. The comparatively dry climate of these valleys is evidenced by the traces of extensive and destructive forest fires that have swept in from the more arid east. They can never survive to reach the drenched shore of the Pacific.

The timber of these forests can in many cases be rafted down to the Pacific, and there is reason to believe that this region, so long unknown, will during the next decade or two be subjugated to the use of the civilized and trading man, thereby following in the fate of the Great Plains of the United States, Canada, South Africa, Australia, and Argentine.

The extreme south of Patagonia, including the long-dreaded Tierra del Fuego and the southern archipelago, is already a seat of civilization and trade. Physically the district is a continuation of the region to the north, but with lessened rainfall. On the west the southern extremity of the Andes, wrapped in mists and evergreen forests, bends around toward Cape Horn and shelters the grassy eastern pampas from the full fury of the west winds which blow so fiercely in these latitudes.

The southern district is cut from east to west by the Strait of Magellan, a narrow and tortuous passage 300 miles in length, and an important part of one of the world's great trade routes. On the north shore of the Strait, located near the boundary between forest and pampa, is Punta Arenas, the southernmost settlement in the world and a thriving town of more than 10,000 people, of whom 1,500 are Austrians. It is too cloudy for wheat to grow, but potatoes, cabbage and hardy vegetables thrive; the climate is salubrious, and it is the only place in South America where there is skating. Many steamers call *en route* from New Zealand and Western South America, and the shipments of wool and frozen meat are increasing. All of the pampa, as far as the Argentine boundary, 75 miles to the north, was taken up as sheep ranges by 1898, most of the owners being English. South of the Strait, in Tierra del Fuego, one English company had leased a tract embracing a degree of latitude and capable of pasturing half a million sheep. It is reported that this island had, in 1896, 70,000 sheep, 1,000 cattle, and 500 horses, and that they had increased threefold by 1900.†

Conway, *The Andes and Tierra del Fuego*, pp. 227-32.

† Petermann's *Mitteilungen*, 1901, pp. 204-Literaturbericht.

Wild cattle live in the dense forests to the west of the pampas, and, as many of these forests contain little valuable timber, they are probably destined to be reduced to cattle pastures, as cattle can thrive better than sheep in the wetter climate.

Punta Arenas is the shipping point for the gold from the surrounding district. In 1899 the shipments were \$5,000 per month, and for the year 1901 it was estimated at 100 kilograms, or about one-ninth of the production of the country. The greater part of Chilean gold is produced in the mining regions of the north.

VI. ECONOMIC CONDITIONS AND PROSPECTS.

The extraordinary development of the nitrate industry has put the finances, commerce, and industry of Chile in a very peculiar position, and one bordering upon unstable equilibrium. The possession of the nitrate fields raises the Government property to 636 million pesos, while all the private property in the country amounts to but 1,436 millions. This one industry has doubled the national commerce, tripled the revenue, and now furnishes two-thirds of the total exports and over three-fourths of the national taxes. If any scientific discovery or other cause should abolish or impair the nitrate industry, serious and painful economic, fiscal, and probably political readjustments would be necessary. The great increase in revenues has not gone into permanent improvements, but to multiply offices for the members of the dominant party. A burdensome navy has been built with foreign borrowings.

The industrial depression of the years 1890-95 caused the adoption of a strong protective tariff, and great efforts are being put forth to convert Chile into a manufacturing country. Foreign capital is being invested, and many new industries are being established, producing such commodities as woollens, cement, chemicals, paper; the first match factory and cotton mill were recently opened, and Chile boasts the only nail mill in South America. But the cotton mill does no spinning, and the nail mill imports its iron, although there seems to be an abundance of iron ore in the country.*

As for coal, the other necessity in iron manufacture, Chile is not so well supplied. There are considerable deposits about latitude 37° and 38° S., also in Valdivia, and there are occasional outcrops throughout the southern archipelago to Tierra del Fuego. The

* In 1901 the total foreign trade was as follows: (Values in American gold):

Imports.....	\$50,735,279
Exports.....	62,832,917

See Commercial Relations of the United States, 1902, p. 731.

only mining centre of importance is between Concepcion and Levu, and Coronel and Lota are the shipping ports. Some of the mines are directly on the seashore, and coal is actually raised from under the Pacific. The mines are from 500 to 1,000 feet deep, and working veins from 2 to 5 feet thick, and the quality is lignite.* Less than a million tons are annually produced, and it is widely used for steam purposes, much being taken away from Coronel as bunker coal by foreign steamers.† The native coke is brittle, and the supply for metallurgical purposes must be imported, and Chile imports from the United States, Europe and Australia as much coal as she produces. The import is chiefly taken by the mineral ports at the north.

The southern part of the Great Valley possesses an abundance of water-power for industrial purposes, and some of it is being utilized for electric installations.

There were at the end of 1901 2,880 miles of railway in Chile, 1330 belonged to the State, and 1550 to private companies. Most of the private lines are in connection with the mining industries of the north, the state lines being chiefly restricted to the more populous region between Valparaíso and Valdivia. This system is soon to be finished to Port Montt in the south, is being extended in the Great Valley, and there is a project under discussion to extend it several hundred miles northward; but it is chiefly for strategic purposes.‡ The real trunk route of Chilean commerce is the free and open Pacific, and the chief commercial function of the railways is

* In the departments of Vallenar, Freirina, Serena, Ovalle, Illapel and in the central region, Tiltill, Pampa, Maipo, "exist extensive deposits of hematite and magnetite, some of which assay as high as 66% of metallic iron." These ores are mostly well below the limit of sulphur and phosphorus and often associated with manganese, of which ore there is considerable export. See *Engineering Journal*, Vol. 8, p. 31.

† The export in 1900 amounted to 325,000 tons, about one-half of the production.

Typical analysis:

Volatile matter.....	40.5%
Fixed carbon.....	50.7
Water.....	4.9
Ash.....	3.9

100.0%

Engineering Journal, Vol. 8, p. 36.

‡ The transandine line to connect Valparaíso with Buenos Aires needs the completion of a tunnel and a few miles of mountain work. It has remained in this condition for a number of years owing to the strained diplomatic relations of the two countries, but there is now prospect of its early completion. The Chileans anticipate the shifting of much of the commerce of Mendoza and western Argentine from Buenos Aires to Valparaíso because the Pacific is so much nearer than the Atlantic.

to serve as feeders to the numerous ports. Nine hundred and seventy miles of navigable rivers also assist in this service.

Steamers from New York and Europe to Western South America call at a dozen or more ports in Chile. Of these Valparaíso, the port for the capital, is the most frequented, having the bulk of the import trade (although not of the export), and entrances of 1,545,072 net tons of shipping in 1900 and 1,938,160 in 1901.

In the slow growth of her population one sees the apparent limitations of Chile's economic future.* There has never been any large immigration. In the thirty years, 1857-1897, Argentine received 2,275,521 immigrants, and Chile but 38,528; and in the year 1897 Argentine received 105,000 and Chile 885.† The foreign population in 1895 was about equally divided between the following nationalities: Spanish, French, Italian, German, British, the numbers ranging from 6,000 to 8,000 each. European emigrants of the labouring class are not likely to go to a country where the wages and standard of life are lower than their own and where brigandage and local hostility to the foreigner are common and the justice of the courts cannot be relied upon. The Chilean population is said to have doubled between 1843 and 1875. The national census of 1895 reported a total population of 2,712,145, an increase of but 7.3 per cent. for the previous decade. The density of population, as shown by the accompanying table, indicates the condition of industrial development in the different provinces. The movement of population between the provinces in the census periods 1885-1895 indicates the industrial changes in progress. The boom in the nitrate fields doubled the population in the provinces of Antofagasta and Tarapacá. The opening of the new lands in the southern forests gave an increase of 135 per cent. in Cautín, 65 per cent. in Malleco, 25 per cent. in Llanquihue, and 20 per cent. in Valdivia. With the exception of Santiago, containing the national capital, none of the provinces of the older central district showed any large increase, and several of them lost by emigration to the more prosperous districts. This loss was heaviest in the provinces on the border of the agricultural zone and the desert. Aconcagua and Atacama lost 25 per cent. of their population and Coquimbo 10 per cent. The attractiveness of other provinces was increased by the depression

* This lack of increase "causes a deep anxiety of the authorities." In physical condition and numbers the population appears to be suffering the consequence of sexual license. " * * * The results of moral impurity amongst all classes and both sexes is acknowledged among themselves to be more than serious."—W. A. Smith, *Temperate Chile*, pp. 37-40.

† Bulletin of Bureau of American Republics, Vol. II., p. 465.

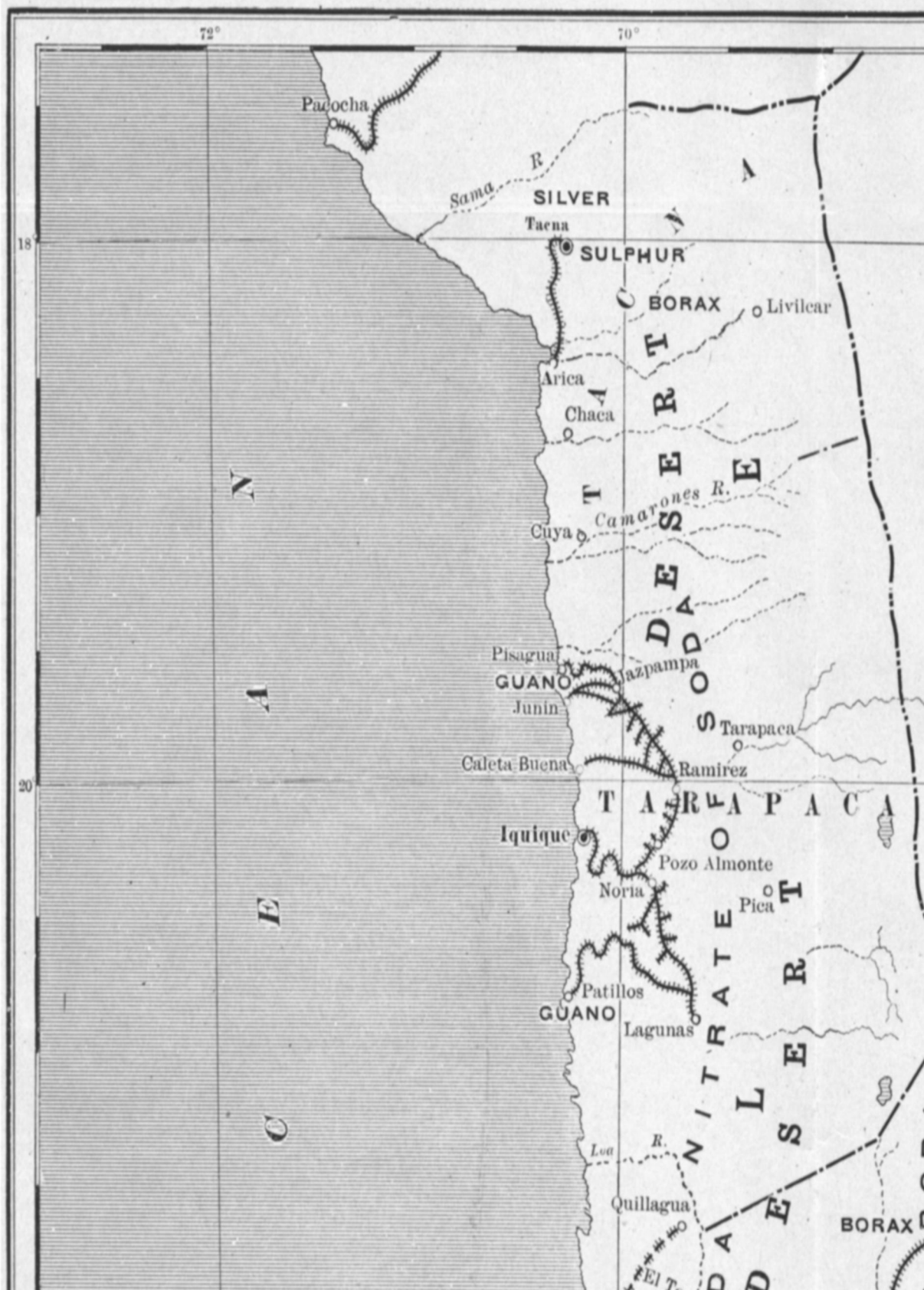
in the copper industry in this district, due to lowered prices. On the southern border of the irrigated section, the three neighbouring provinces of Maule, Linares, and Talca were slight losers in population, evidently because of the new lands being opened up in the better-watered district to the southward.

CHILE.	AREA, SQUARE MILES.	POPULATION, 1895.	POPULATION PER SQ. MILE.
PROVINCE.			
Atacama.....	28,330	59,713	2.01
Antofagasta.....	47,932	44,685	.9
Tarapacá.....	19,306	89,751	4.6
Tacna.....	8,688	29,523	2.8
Coquimbo.....	12,873	160,898	12.4
Aconcagua.....	6,226	113,165	19.3
Valparaiso.....	1,659	220,756	134.9
Santiago.....	5,223	415,636	79.5
O'Higgins.....	2,524	85,277	33.7
Colchagua.....	3,295	157,566	41.5
Curico.....	2,913	103,242	35.4
Talca.....	3,678	128,961	35.
Linares.....	3,589	101,858	29.2
Maule.....	2,931	119,791	40.8
Ñuble.....	3,556	152,935	43.
Concepción.....	3,535	188,190	56.1
Bio Bio.....	4,185	88,749	21.3
Malleco.....	2,857	98,032	34.3
Arauco.....	4,248	59,237	13.9
Cautin.....	3,126	78,221	25.1
Valdivia.....	8,315	60,687	7.3
Llanquihue.....	15,444	78,315	5.1
Chiloé.....	9,653	77,750	8.1
Magallanes (ter.).....	75,292	5,170
	279,909	2,712,145	9.06

The industrial efficiency, as well as the intellectual alertness of a people, are indicated by their use of the mail and telegraph. In these respects a comparison between the Chileans and Americans is shown in the following table:

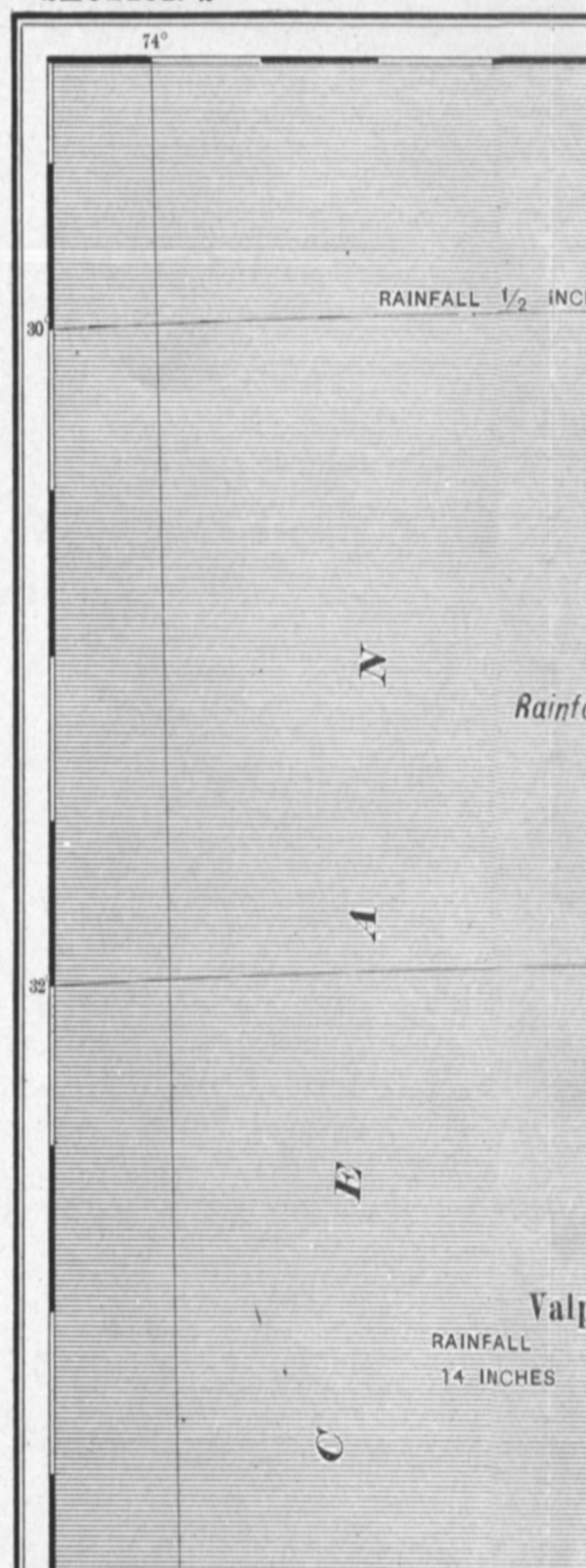
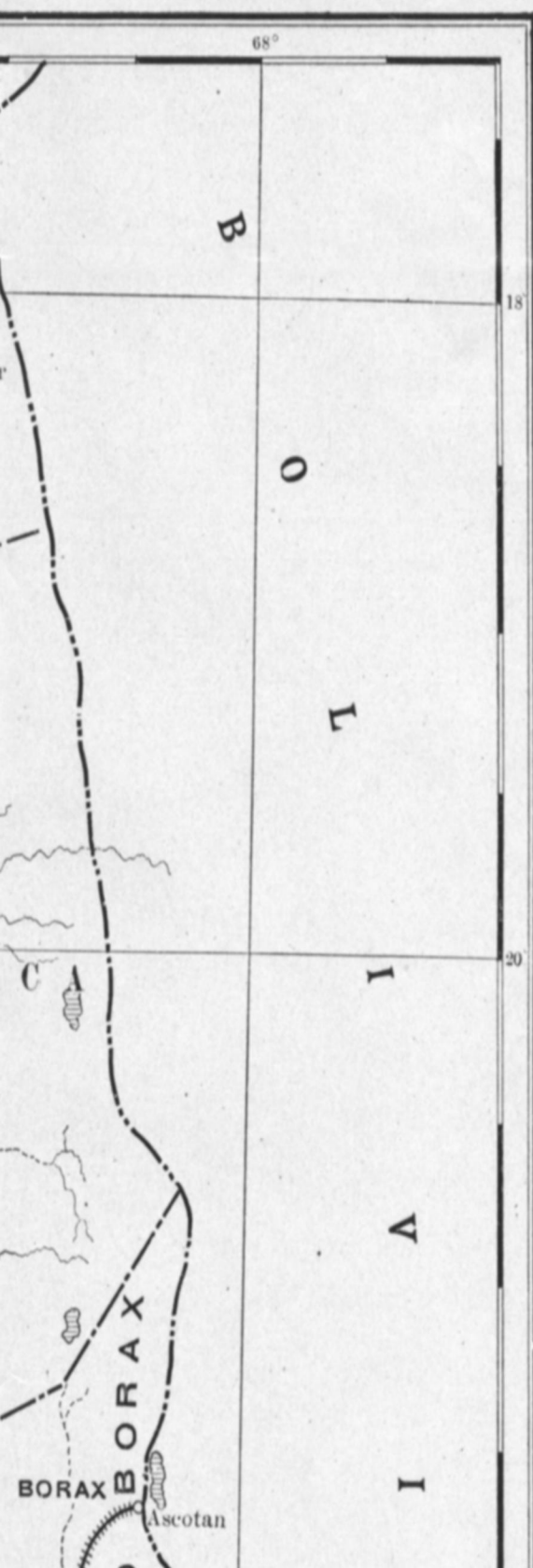
	TELEGRAMS PER CAPITA PER YEAR.	MAIL PIECES PER CAPITA PER YEAR.
Chile.....	47	12
United States.....	83	180

SECTION 1



ECONOM

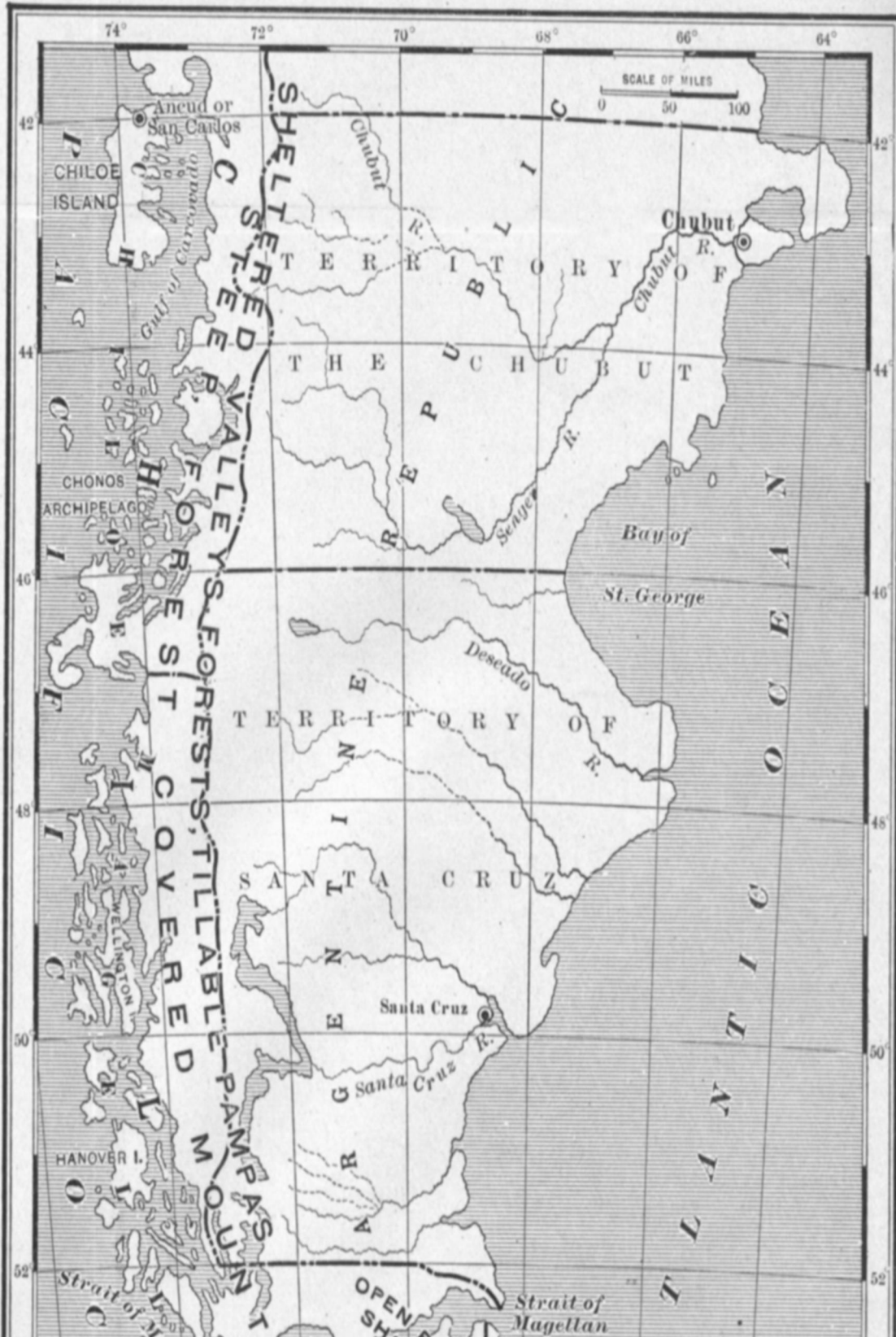
SECTION 2



ECONOMIC MAP OF CHILE



SECTION 3

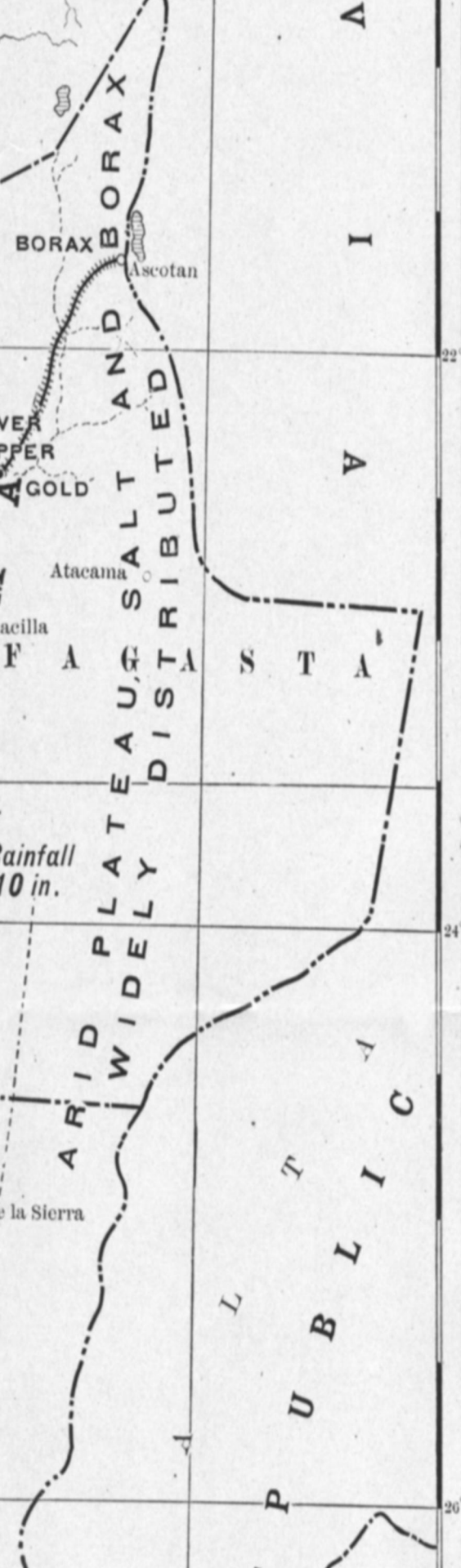


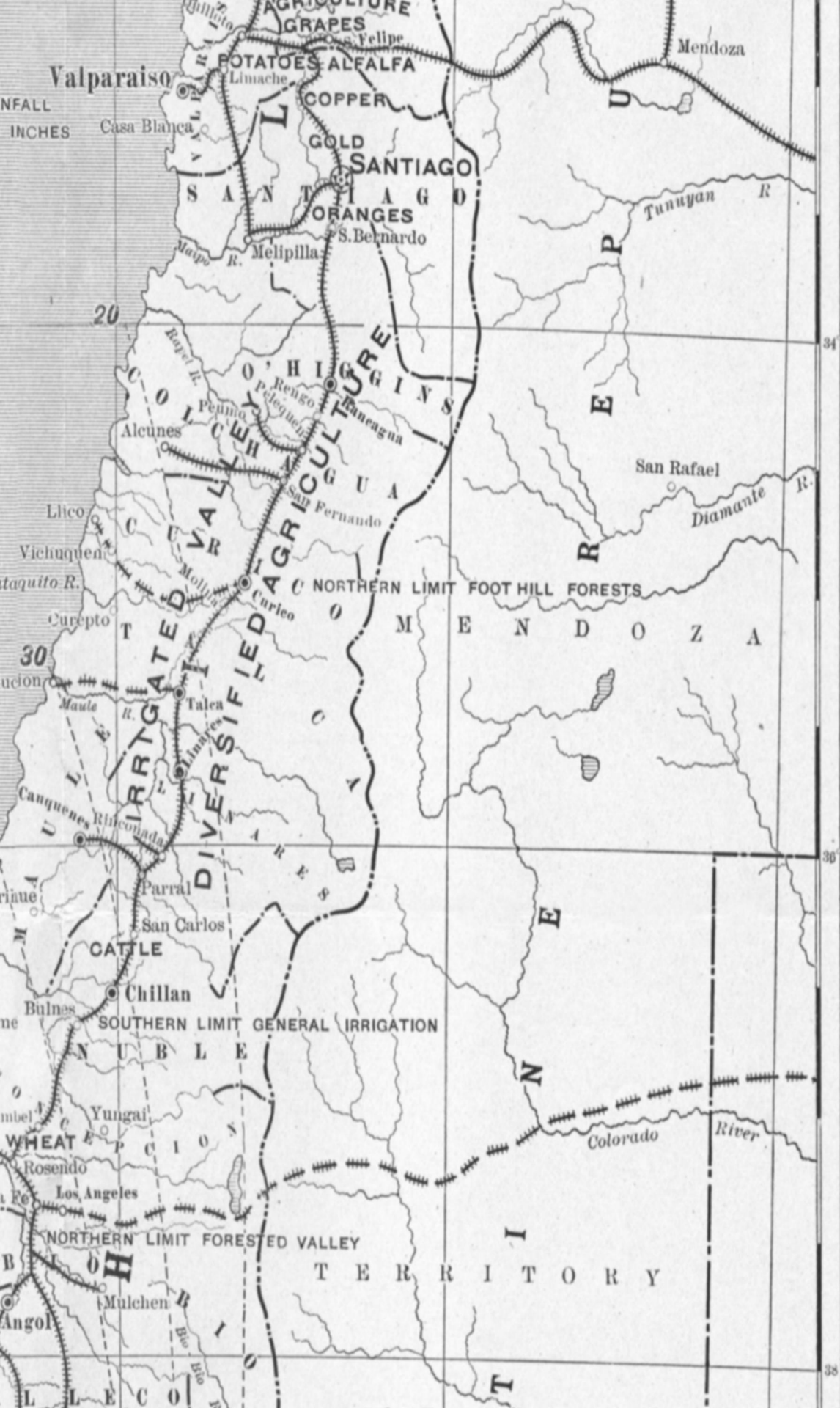
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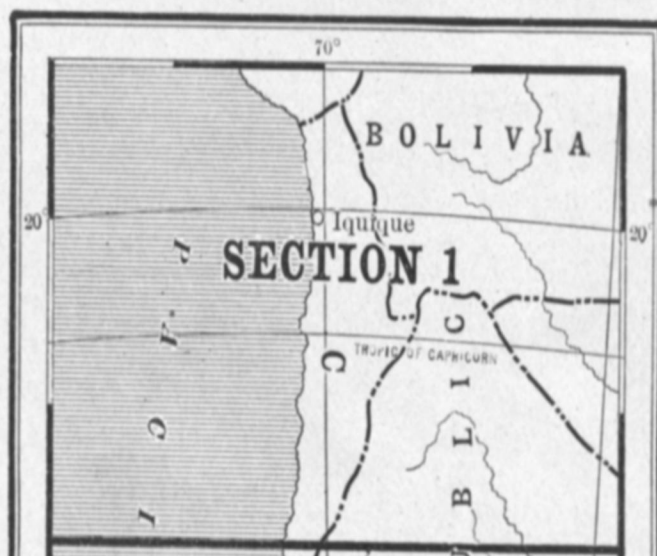
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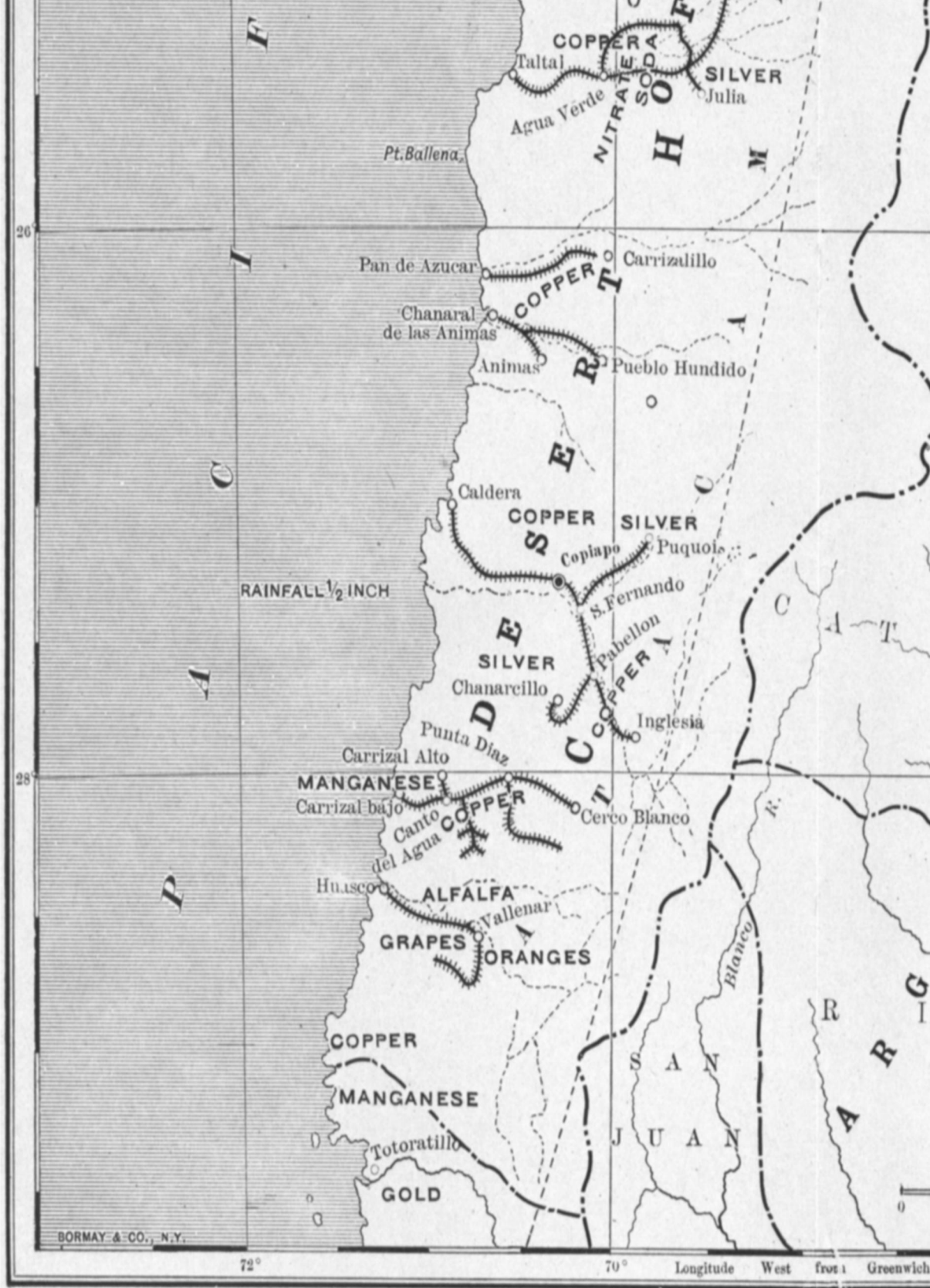
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Bulletin of the American Geographical Society, February, 1904.

